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Liao

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[54] **TWO-PIECE LOCK WITH HIDDEN LOCKING MECHANISM**

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[51] **Int. Cl.**[7] **A44B 17/00**

[52] **U.S. Cl.** **24/625**; 24/614; 24/589; 24/613; 24/605

[58] **Field of Search** ..... 24/589, 605, 1, 24/607, 612, 616, 613, 614, 615, 618, 625, 265 WS, 265 B

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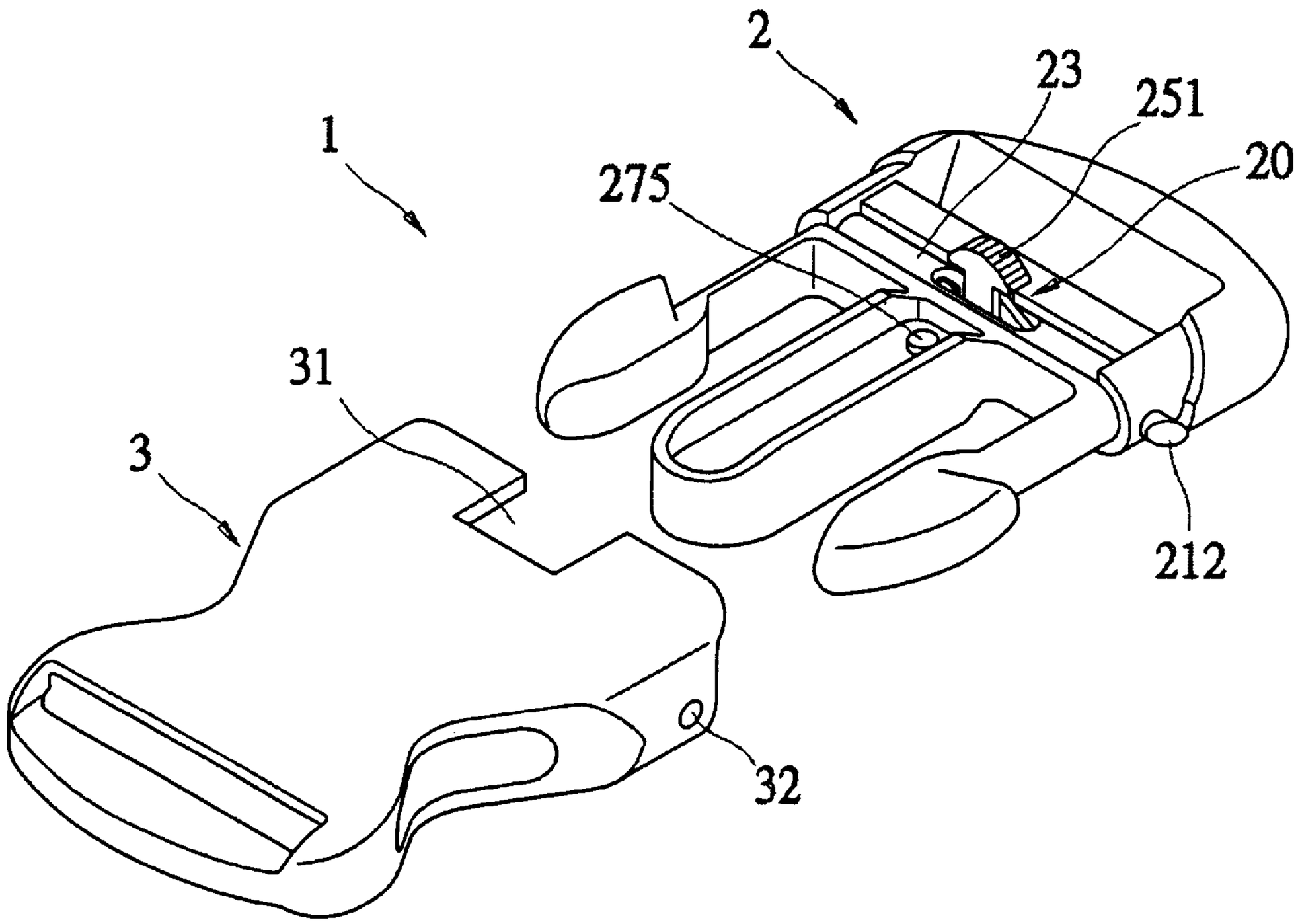
Primary Examiner—James R. Brittain

Attorney, Agent, or Firm—Dougherty & Troxell

[57] **ABSTRACT**

A two-piece lock comprises a male connector; a locking mechanism provided on the male connector including a pair of connecting rods each having a rod portion and a slope portion, a pair of springs each putting on one of the rod portions, a tube member for receiving the springs and the rod portions on two opposite sides having a longitudinal center opening and a transverse center hole, a movable member having a head portion and a recessed body portion, and a pair of connecting members each pivotably connecting the rod portions and the recessed body portion which is pivotably secured to the tube member by inserting a fixing means through the transverse center hole and a predetermined position of the recessed body portion; and a female connector comprising a pair of holes on two opposite sides each receiving one of the slope portions in a locked position, and a recessed portion for receiving the head portion. As such, the locking mechanism is only seen by the head portion of the movable member for achieving a hidden safety mechanism. Further, the safety mechanism is enhanced by requiring to apply a predetermined force to slide the head portion of the movable member toward a predetermined direction prior to opening the lock.

7 Claims, 6 Drawing Sheets



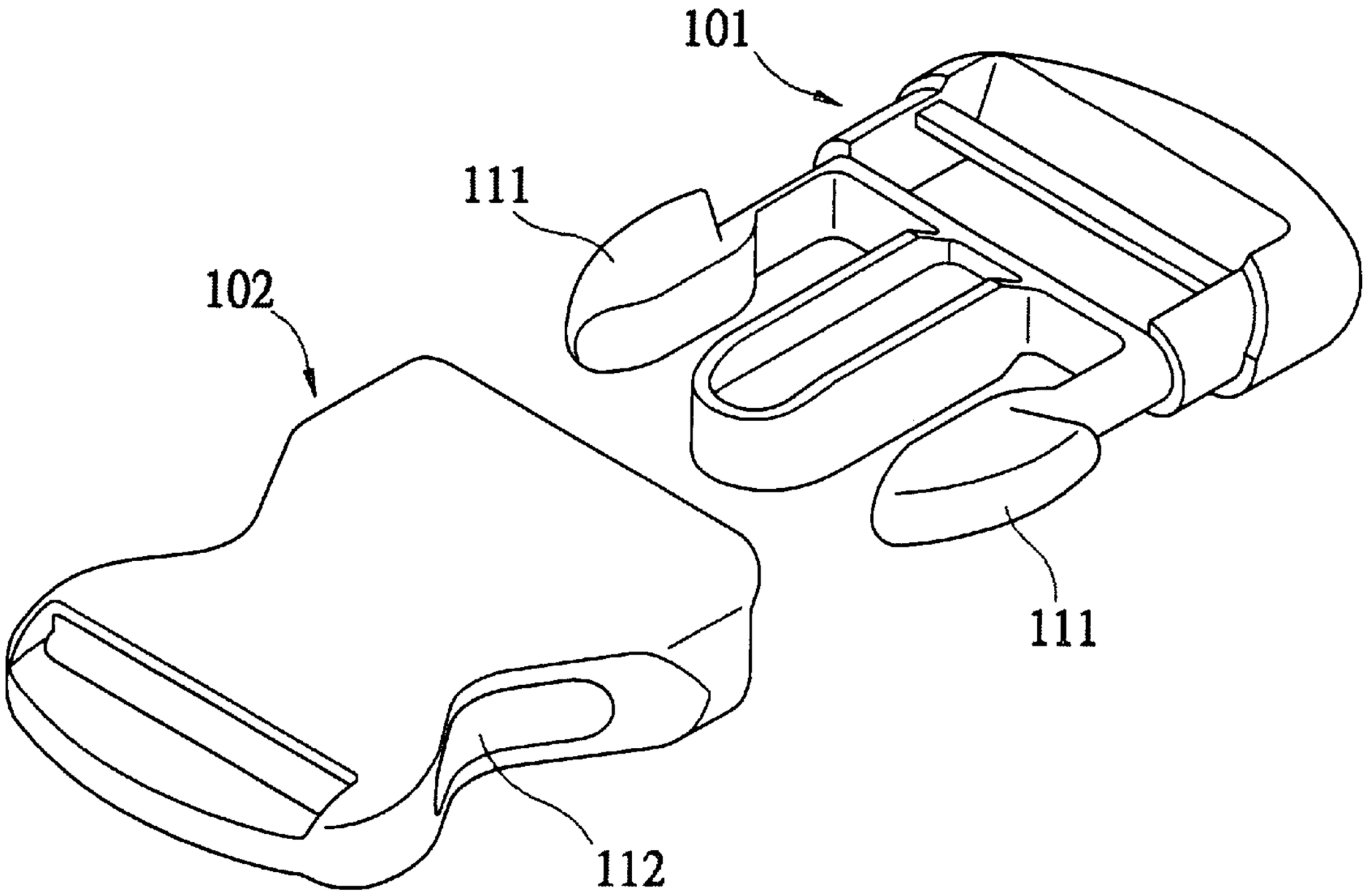


FIG. 1A(PRIOR ART)

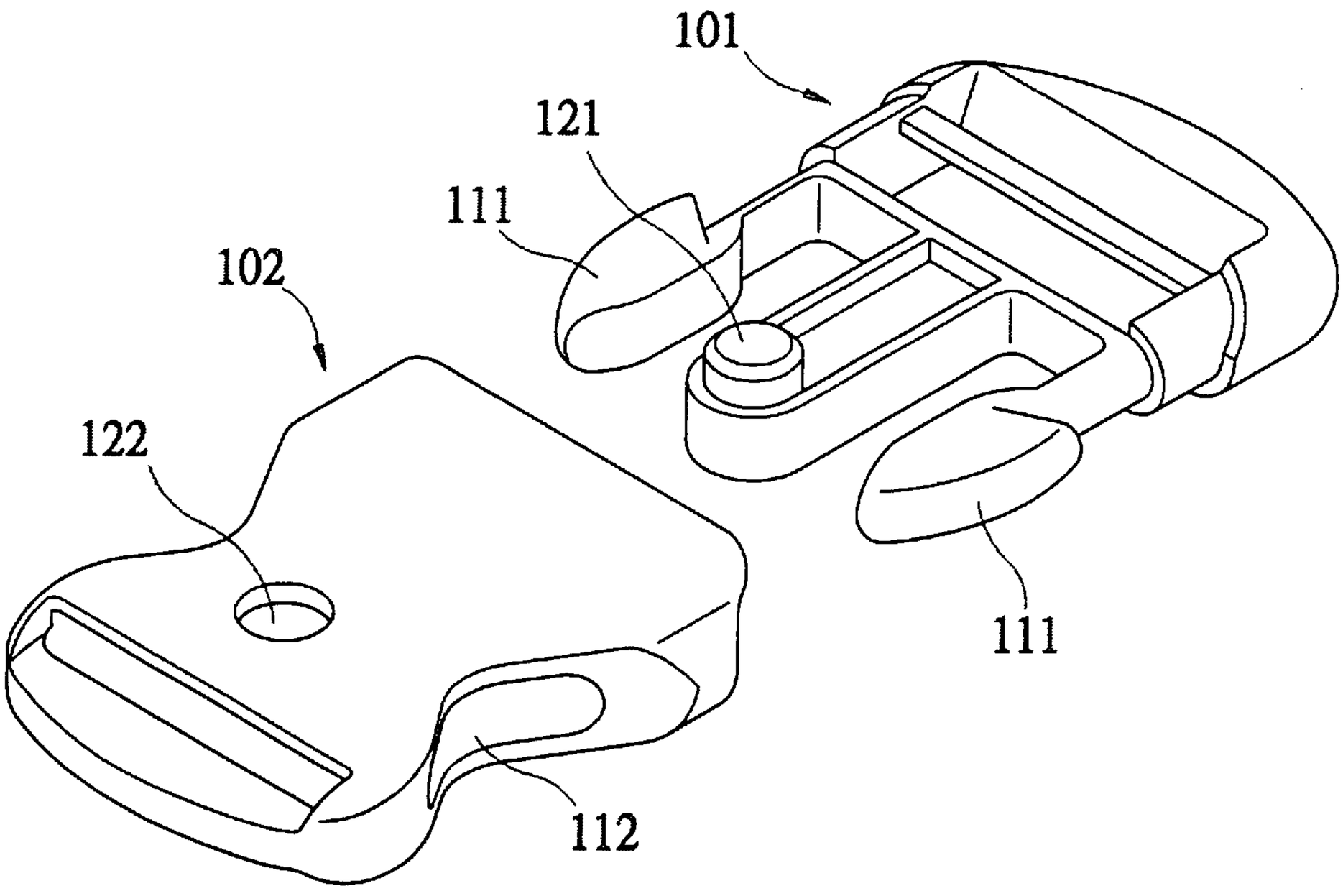


FIG. 1B(PRIOR ART)

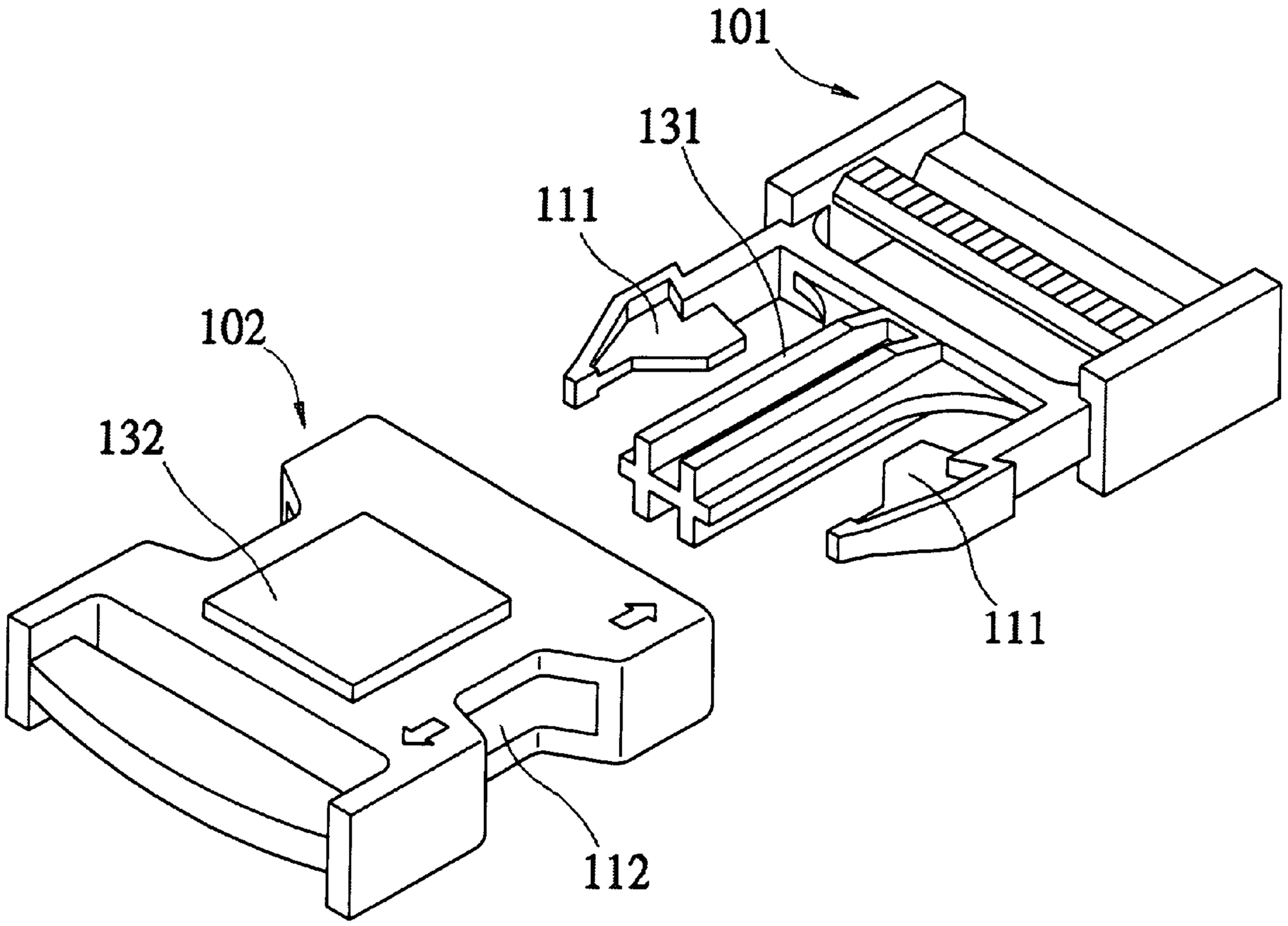


FIG. 1C(PRIOR ART)

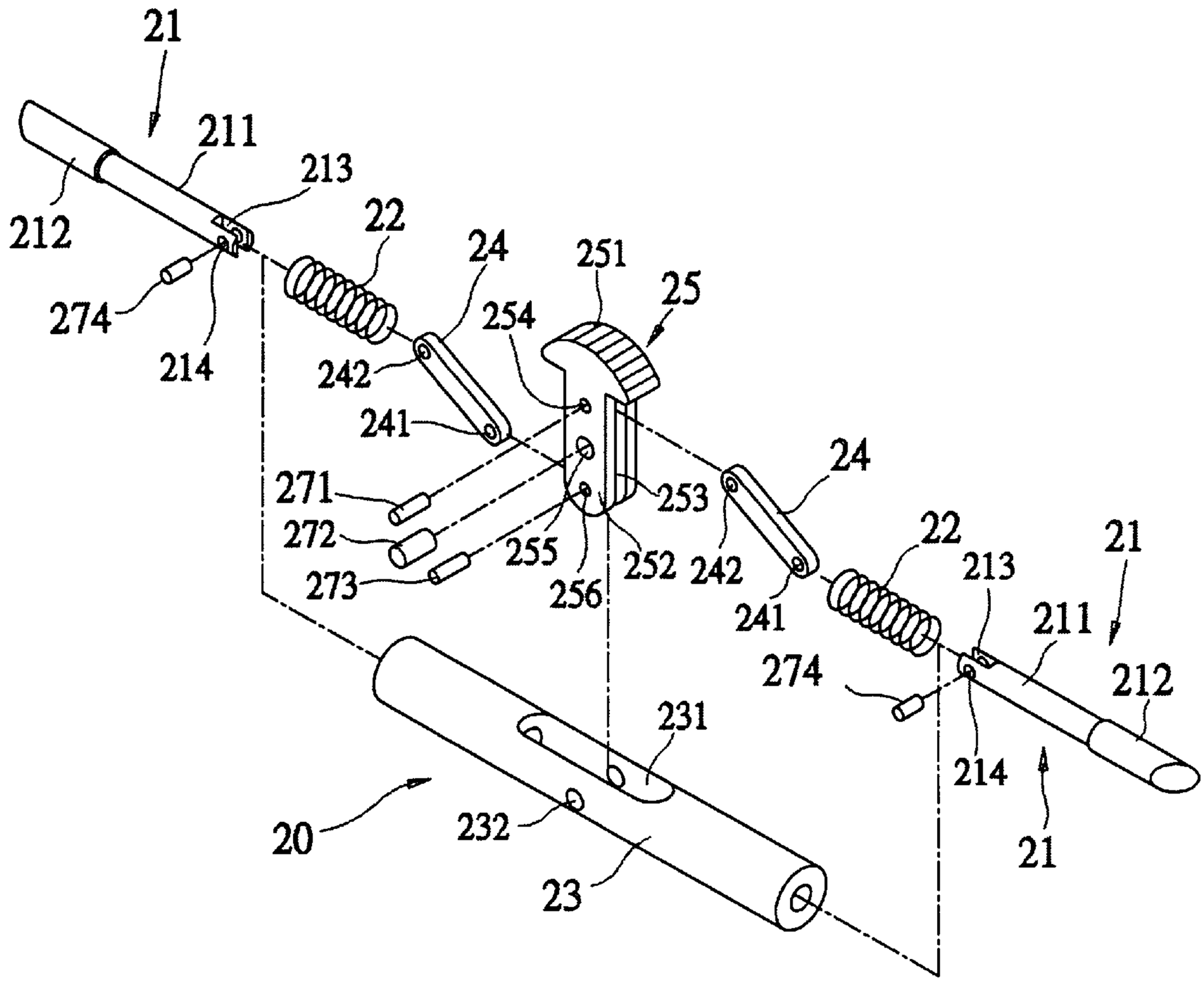

21
211
213
212
22
24
251
25
254
274
214
242
241
271
272
273
255
256
252
253
24
242
241
22
213
21
211
274
212
231
214
20
232
21
23

FIG. 2

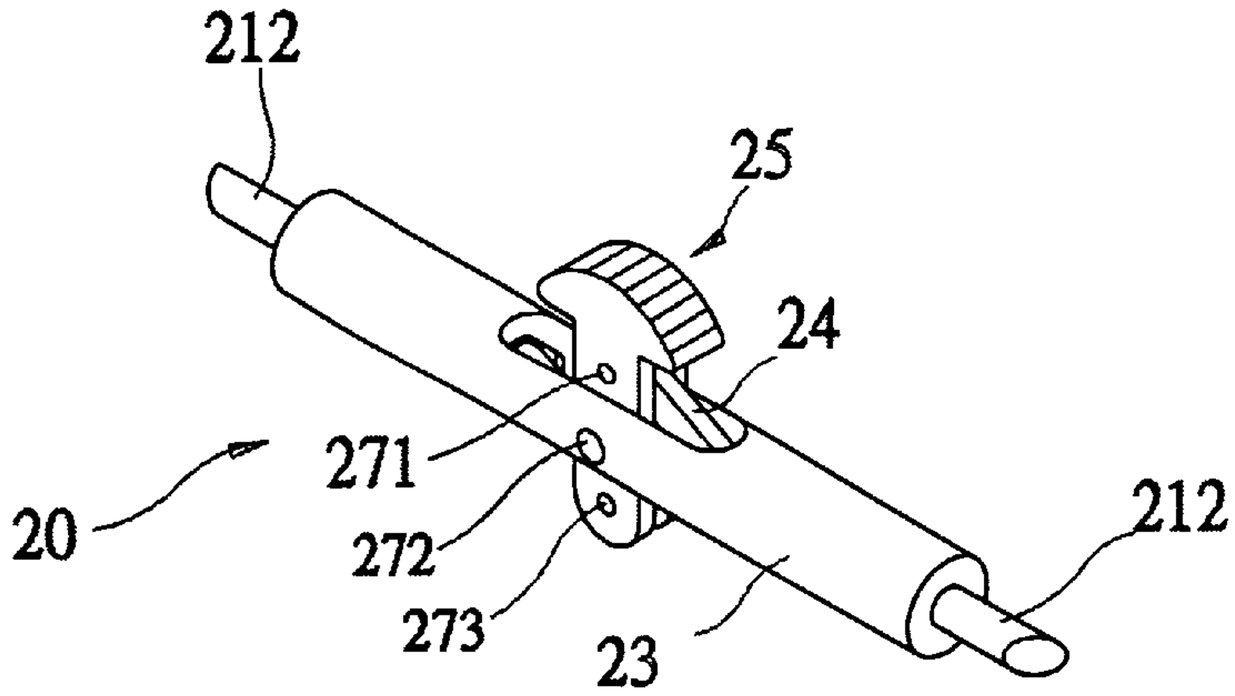

212
25
24
271
20
272
212
273
23

FIG. 3

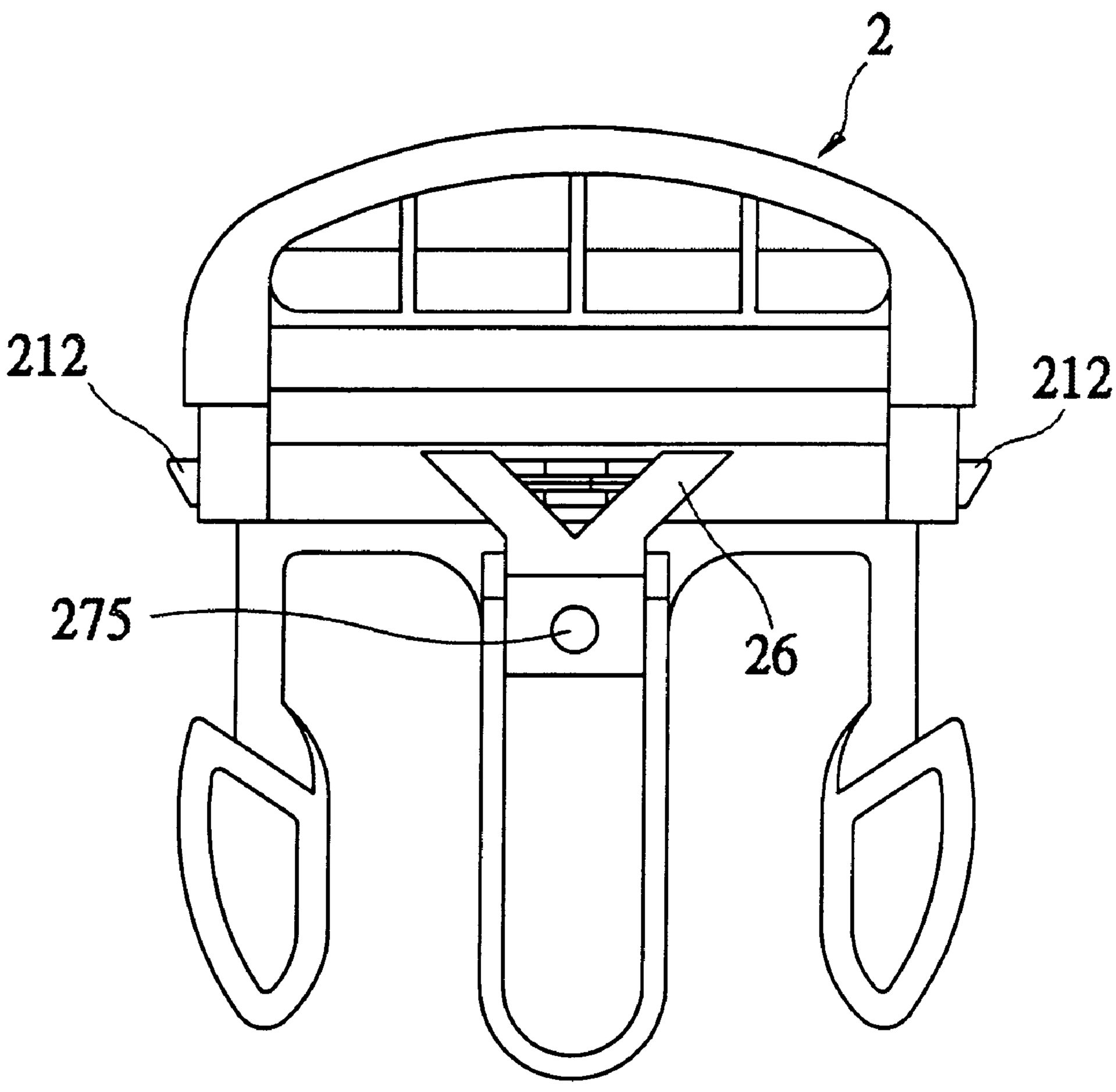


FIG.4

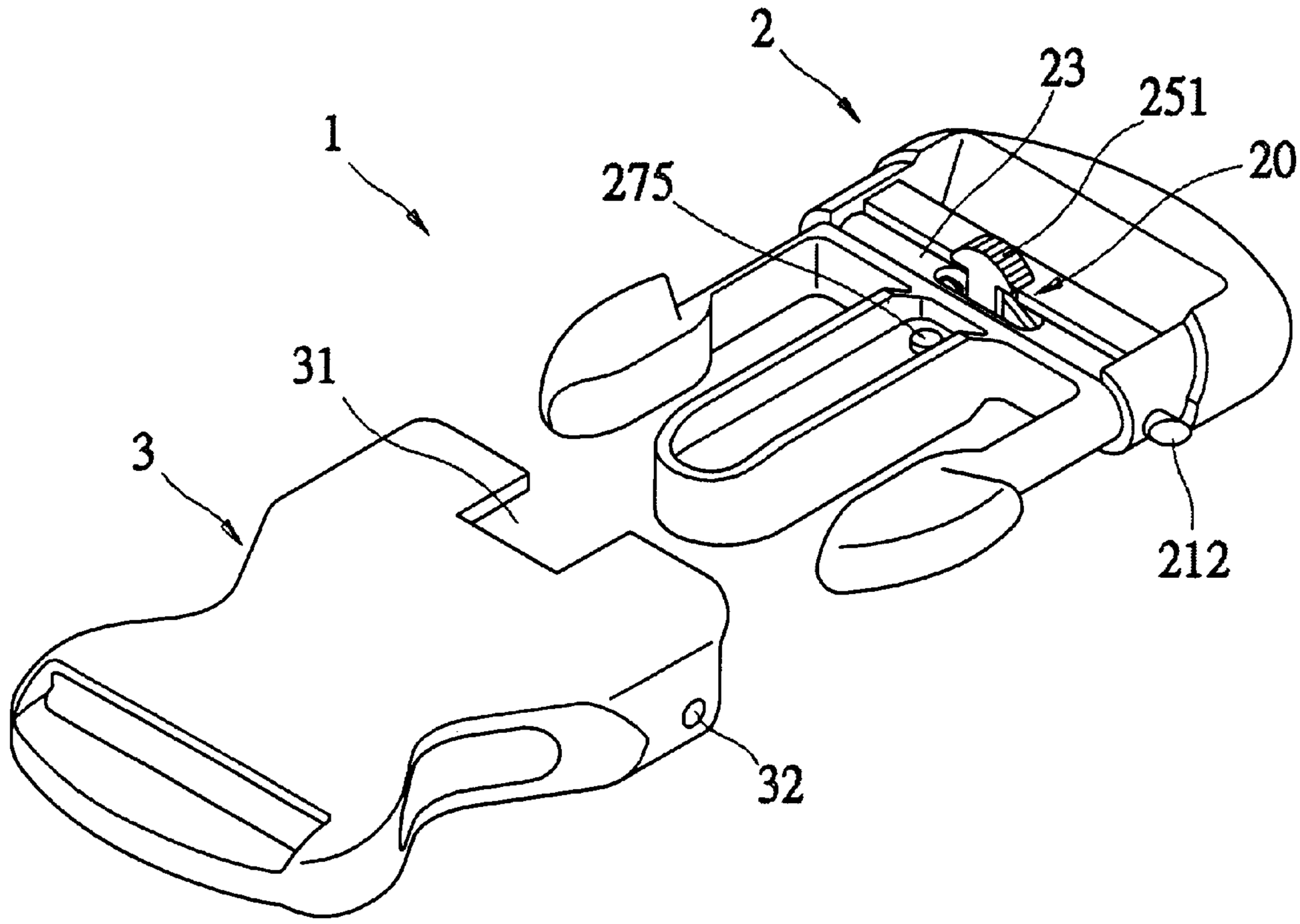


FIG.5

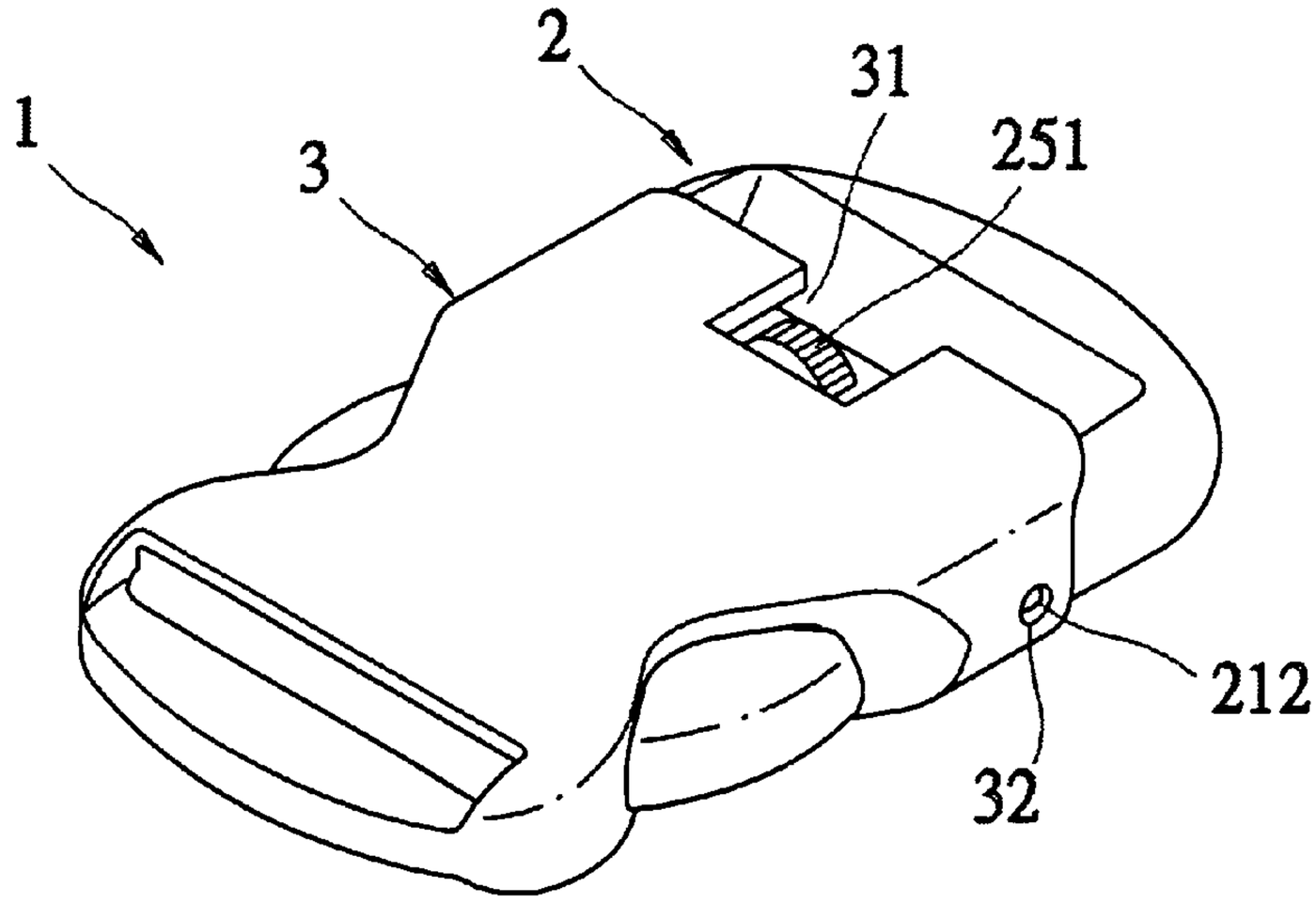


FIG.6

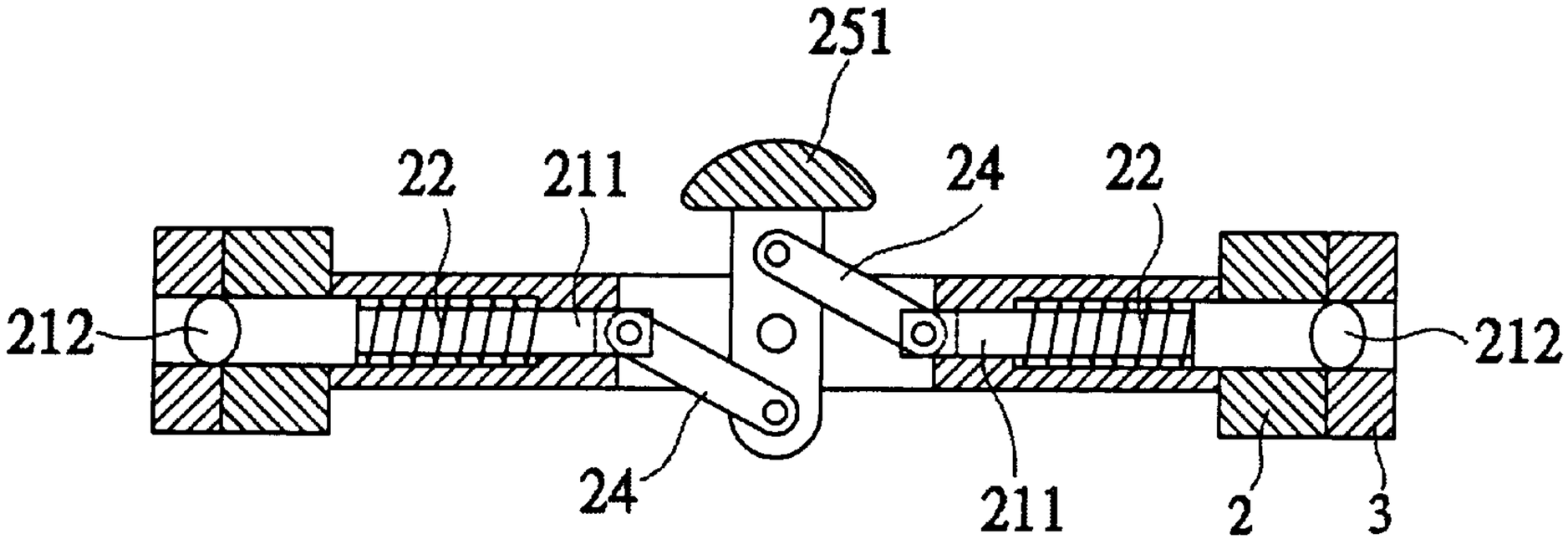

251
22
211
24
22
212
212
24
211
2
3

FIG. 7

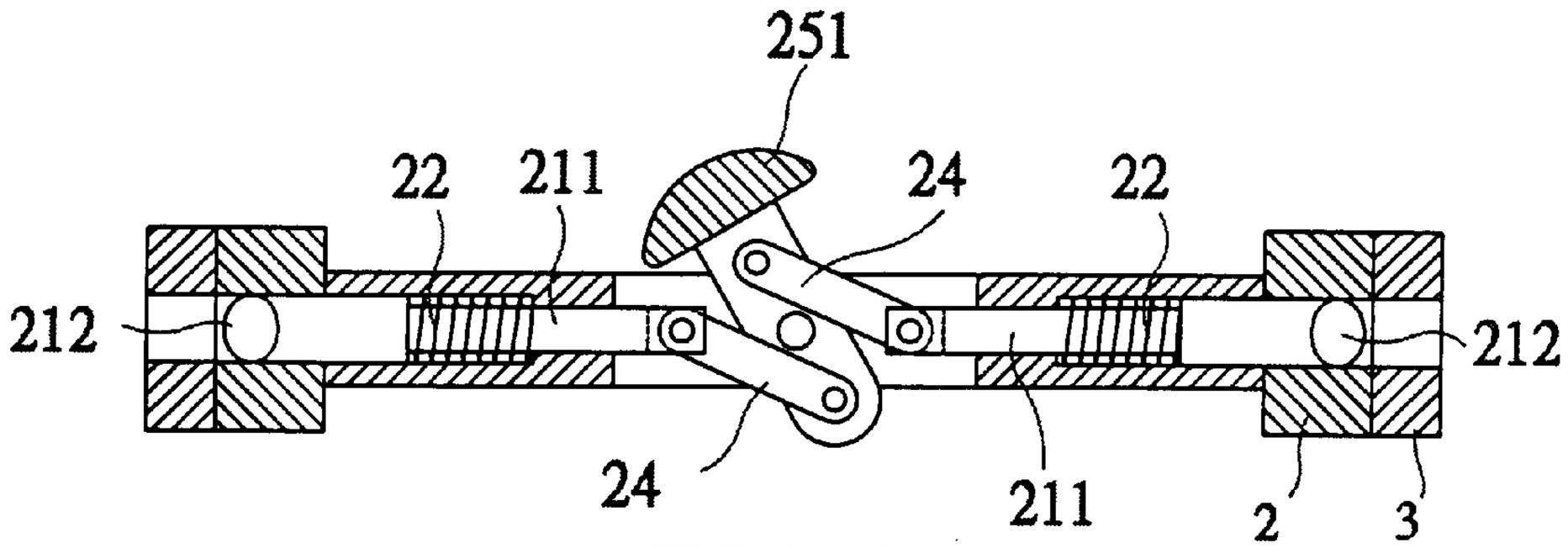

251
22
211
24
22
212
212
24
211
2
3

FIG. 8

TWO-PIECE LOCK WITH HIDDEN LOCKING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a two-piece lock, and more particularly to a two-piece lock with hidden locking mechanism in order to form a safety device.

2. Description of Related Art

A first prior art two-piece lock is shown in FIG. **1**. The safety mechanism is achieved by inserting a male connector **101** into a female connector **102** such that a pair of flexible projections **111** are locked in a pair of corresponding cavities **112**. However, the flexible projections **111** are subject to be pressed inward incidentally because part of it is exposed to outside. The safety mechanism becomes neutralized if such occurs.

A second prior art two-piece lock is shown in FIG. **2**. Similarly, the safety mechanism is substantially achieved by inserting the male connector **101** into the female connector **102** such that the pair of flexible projections **111** are locked in the pair of corresponding cavities **112**. Further, the safety mechanism is enhanced by providing an elastic raised member **121** and a hole **122** which are interlocked when the male connector **101** is inserted into the female connector **102**. However, the flexible projections **111** and the elastic raised member **121** are subject to be pressed inward incidentally because part of them are exposed to outside. The safety mechanism also becomes neutralized if such occurs.

A third prior art two-piece lock is shown in FIG. **3**. The safety mechanism is substantially achieved by inserting the male connector **101** into the female connector **102** such that the pair of flexible projections **111** are locked in the pair of corresponding cavities **112**. Further, the safety mechanism is enhanced by providing a projection **131** and an elastic button **132** which are interlocked when the male connector **101** is inserted into the female connector **102**. However, the flexible projections **111** and the elastic button **132** are subject to be pressed inward incidentally because part of them are exposed to outside. The safety mechanism again becomes neutralized if such occurs.

Thus, it is desirable to provide an improved two-piece lock with hidden locking mechanism in order to overcome the above drawbacks of prior art.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a two-piece lock comprising a male connector; a locking mechanism provided on the male connector including a pair of connecting rods each having a rod portion and a sloped portion, a pair of springs each placed on one of the rod portions, a tube member for receiving the springs and the rod portions on two opposite sides having a longitudinal center opening and a transverse center hole, a movable member having a head portion and a recessed body portion, and a pair of connecting members each pivotally connecting the rod portions and the recessed body portion which is further pivotally secured to the tube member by inserting a fixing means through the transverse center hole and a predetermined position of the recessed body portion; and a female connector comprising a pair of holes on two opposite sides each receiving one of the sloped portions in a locked position, and a recessed portion for receiving the head portion. As such, the locking mechanism is only seen by the head portion of the movable member for achieving a hidden

safety mechanism. Further, the safety mechanism is enhanced by requiring a predetermined force to slide the head portion of the movable member toward a predetermined direction prior to opening the lock.

The above and other objects, features and advantages of the present invention will become apparent from the following detailed description taken with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1A–1C** are perspective views of a first, a second, and a third prior art two-piece locks respectively;

FIG. **2** is an exploded view of a locking mechanism of the present invention;

FIG. **3** is a perspective view of the locking mechanism of FIG. **2**;

FIG. **4** is a bottom plan view of a male connector of the present invention;

FIG. **5** a perspective view of the present invention in which the male connector is separated from a female connector;

FIG. **6** is another perspective view of the present invention in which the male connector is inserted into the female connector; and

FIGS. **7–8** are cross-sectional views of the locking mechanism and part of the female connector for showing a locked and an open positions respectively.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **2**, there is shown an exploded view of a locking mechanism **20** constructed according to the invention. The locking mechanism **20** includes a pair of connecting rods **21** each having a rod portion **211** and a sloped portion **212**, a pair of springs **22**, a tube member **23** having a center opening **231** and a center hole **232**, a pair of connecting members **24**, and a movable member **25**. The rod portion **211** has a receiving space **213** and a hole **214** both on the left end. The connecting member **24** has a first hole **241** on one side and a second hole **242** on the opposite side. The movable member **25** comprises a head portion **251** and a body portion **252** having a receiving space **253** and three holes **254**, **255**, and **256**.

The assembly of the locking mechanism **2** is described as follows.

As to the components on the right side such as the connecting rod **21**, the spring **22**, and the connecting member **24**, firstly, place the spring **22** on the rod portion **21**. Then, put the right end of the connecting member **24** into the receiving space **213**, and use a rivet **274** to fasten the connecting member **24** and the connecting rod **21** together by inserting through the hole **214**,the first hole **241**, and the receiving space **213**. Then, insert the connected connecting rod **21**, the spring **22**, and the connecting member **24** into the tube member **23** from the right end thereof until the second hole **242** located substantially on the center of the opening **231**. Note that until this stage the assembly of components on the left side of the movable member **25** is the same as that on the right side of the movable member **25**. Thus, a detailed description thereof will be omitted herein for the sake of brevity. Then, insert the movable member **25** into the opening **231** with the hole **255** of the movable member **25** disposed correspondingly to the hole **232** of the opening **231**. Then, use a rivet **271** to fasten the right connecting member **24** and the movable member **25** together by insert-

ing through the hole **254** and the second hole **242** of the right connecting member **24**. Then, use a rivet **272** to fasten the tube member **23** and the movable member **25** together by inserting through the hole **232** and the hole **255**. Finally, use a rivet **273** to fasten the left connecting member **24** and the movable member **25** together by inserting through the hole **256** and the first hole **241** of the left connecting member **24** to form an assembled locking mechanism **20** as shown in FIG. **3**. The connecting members **24** are pivotable on the rivets **271** and **273** within the receiving space **253** in a limited range, while the movable member **25** is pivotable on the rivet **272** in another limited range.

In FIG. **4**, a flexible Y-shaped projection **26** is fixed to the center of a male connector **2** by a rivet **275**. Such that the projection **26** can acts as enhancing the safety mechanism.

A two-piece lock **1** of the invention comprising the male connector **2** and a female connector **3** is illustrated in FIG. **5** in which the male connector **2** is separated from the female connector **3**, i.e., prior to being locked. The female connector **3** comprises a pair of holes **32** (only one is shown) on two opposite sides and a recessed portion **31**. It is seen that the slope portion **212** is extended a predetermined distance from the surface of the male connector **2**. Note that the sloped portions **212** are movable within the tube member **23** by the expansion and compression of the spring **22**, or by exerting a force on the sloped portions **212**. As such, the sloped portions **212** are received within the holes **32** when the male connector **2** is inserted into the female connector **3** to form the locked twopiece lock **1** as illustrated in FIG. **6**. Note that only the head portion **251** is seen from outside, i.e., received in the recessed portion **31**, while all other components of the locking mechanism **20** are hidden within the lock **1**.

The locked locking mechanism **20** is illustrated in FIG. **7**. It is seen that the movable member **25** is on an upright position. Further, the top end of the sloped portions **212** are in the join of the male connector **2** and female connector **3**.

It is required to apply a predetermined force in order to slide the head portion **251**. Then, the right connecting member **240** extends to left, while the left connecting member **240** extends to right which in turn compress the springs **22** to force the rod portions **211** and the slope portions **212** move inwardly. As such, the slope portions **212** are completely received within the male connector **2** as shown in FIG. **8**. Finally, pull the male connector **2** out of the female connector **3** in order to open the lock **1**.

While the invention herein disclosed has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope of the invention set forth in the claims.

What is claimed is:

1. A lock comprising a male connector, a locking mechanism provided on the male connector including a pair of connecting rods each having a rod portion and a sloped portion, a pair of springs each placed on one of the rod portions, a tube member for receiving the springs and the rod portions on two opposite sides having a longitudinal center opening and a transverse center hole, a movable member having a head portion and a recessed body portion, and a pair of connecting members each pivotally connecting the rod portions and the recessed body portion by a first fixing means; and

a female connector comprising a pair of holes on two opposite sides each receiving one of the sloped portions in a locked position, and a recessed portion for receiving the head portion;

wherein the recessed body portion is pivotally secured to the tube member by inserting a second fixing means through the transverse center hole and a predetermined position of the recessed body portion.

2. The lock of claim **1**, wherein the sloped portions are received within the male connector in an open position.

3. The lock of claim **1**, wherein the predetermined position is a center of the recessed body portion.

4. The lock of claim **1**, wherein the first fixing means is a rivet.

5. The lock of claim **1**, wherein the second fixing means is a rivet.

6. The lock of claim **1**, wherein the head portion is only allowed to move toward a predetermined direction when a predetermined force is applied on it prior to opening the lock.

7. The lock of claim **6**, wherein the predetermined direction is from right to left.

* * * * *